# EARTH SUMMIT IN FOCUS

**Number 9**

## Protecting the Atmosphere: Making the Transition to Clean Energy

**United Nations Conference on Environment and Development**

Each morning, as people begin the day, they take part in a process that is altering life on the planet. As 500 million cars and other vehicles are started, millions of small pollutant clouds are released into the air. As work gets under way in factories and power plants, on farms and in forests burnt to clear land, the pollution cloud grows.

Poor air quality is a global health hazard—from smog alerts in Los Angeles and Sydney to worsening traffic pollution in Lagos and Bangkok and the coal-fired blackness of Eastern Europe. More than 1 billion people breathe air that does not meet minimum health standards. Respiratory diseases, cardiac problems and cancer are the result.

Global problems demand international solutions. Pollution of the atmosphere will be one of the primary concerns of government leaders when they meet for the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, from 1 to 12 June 1992. On the agenda of the Conference, known as the Earth Summit, will be proposals to prevent acid rain, the warming of the planet and the destruction of the ozone layer (see also Focus No. 10).

### Global Warming

Air pollution has been viewed as a local problem: on a bad day, it hangs in a yellow-grey cloud overhead; on a good day, the winds will take with them the visible reminder that the air around us is being used as a rubbish dump.

Out of sight but still potent, the pollutant gases accumulate in the atmosphere. Evidence suggests that here the gases are trapping the heat of the sun, causing the planet to warm as if it were in a greenhouse.

Carbon dioxide ($CO_2$)—the main cause of the "greenhouse effect"—is entering the atmosphere at the rate of 8.5 billion tons a year. Mostly the result of the burning of fossil fuels (coal, oil and natural gas), $CO_2$ is being spewed from exhaust pipes of vehicles and industrial smokestacks. The second largest cause is the burning of forests to clear land.

Other gases are also suspected of contributing to climate change, notably chlorofluorocarbons (CFCs, comprising 20 per cent of "greenhouse gases"), methane (16 per cent), ozone (8 per cent) and nitrous oxide (6 per cent). However, $CO_2$ from energy-related activities was responsible for about half of the global warming effect between 1980 and 1990, according to the Inter-Governmental Panel on Climate Change. The Panel, made up of several hundred scientists from 35 countries, was set up by the UN in 1988 to assess changes in global climate patterns.

The best hope for avoiding the life-changing impact of global warming will be to reduce the amount of $CO_2$ released into the atmosphere. Getting agreement from the main producers of $CO_2$ is central to negotiations for a convention on climate change, now under way as part of the Earth Summit process.

"Accelerated climate change must now be seen as the primary risk to the human future", notes Maurice Strong, Secretary-General of the Conference. "Like a cancer spreading through the body of our global society, the effects are likely to be irreversible by the time the symptoms have become painful."

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Unless the international community can come to an agreement on reducing the global output of $CO_2$, scientists believe it is likely that life on Earth will soon be irreversibly altered. Sea levels will rise, and small island nations and low-lying coastal lands in many countries will be engulfed. Weather patterns will change, affecting agriculture: where there were rains, there may be none; where temperatures were warm, they may be cooler. Fresh water will become scarcer as groundwater evaporates, run-off is reduced and salt water leaks in and contaminates underground sources. The impact on the lives of millions of people will be devastating.

Developing countries fully share the risks of global climate change. In fact, because their environments are often more ecologically fragile and their economies more vulnerable, they are likely to be less able to deal with the projected consequences of climate change than more industrialized countries.

### Who Produces $CO_2$?

At present most $CO_2$ is produced by the industrialized countries, a quarter of it by the United States. Of the remainder, according to 1986 figures, 19 per cent was produced by the former Soviet Union, 14 per cent by the countries of the European Community, 10 per cent by China, 3 per cent by India and 1 per cent by Brazil.

This pattern will change. As developing countries grow economically, they can be expected to contribute significantly to global atmospheric problems unless assisted to use cleaner, more efficient technologies and environmentally sustainable sources of energy. These are available but either are more expensive than conventional technology or require research and development.

Generally, a country consumes energy at a faster rate at the beginning of its industrial growth than at later stages. In some developing countries, energy consumption is so low that an increase will be essential just to reach a basic standard of living. In others, people are beginning to obtain the comforts of modern living—cars, appliances and refrigeration. They will all, unless given assistance to develop differently, adopt the model used by industrialized countries.

Most developing countries plan to meet their energy needs with massive investments in fossil-fuel technology. China aims to ensure that every household has a refrigerator. Even if the units are small and energy-efficient, this will require the energy equivalent of the output of 20 large nuclear reactors.

### Forests Keep the Balance

In the past, the balance between nature and the activities of humans was maintained, in the case of $CO_2$, primarily because much of the planet was covered with forests. Trees convert $CO_2$ into life-giving oxygen; thus forests are viewed as "sinks" for absorbing carbon.

The increased output of $CO_2$ in the developed world after the industrial revolution was accompanied by widespread deforestation: more than two thirds of the forests of Western Europe have disappeared since Roman times; 95 per cent of the virgin forests in the United States have been felled in the last 150 years.

The focus of global preservation efforts is now on tropical rain forests, which are mostly located in developing countries. As much as 17 million hectares of tropical forest are levelled each year, to be sold as timber for export and to clear land for agriculture, grazing and settlements. The clearing of old forests in North America also continues at a devastating rate: in Canada, 7 million hectares of forest were burnt in 1989; 2 million hectares are levelled in an average year.

Member States taking part in United Nations talks for a legally binding convention on climate change are attempting to reach agreement on reducing the output of $CO_2$ so that by the year 2000 the amount released into the atmosphere annually will be the same as it was in 1990, 5.5 billion tons. European countries and Japan appear willing to adopt such measures; the United States, so far, is opposed to setting definite targets for $CO_2$ emissions. It is likely that such an agreement will also emphasize the need to preserve global forest cover.

### The Transition to Sustainable Energy

Reducing $CO_2$ emissions will require the use of environmentally cleaner fuels, particularly for

industry—which uses between one third and one half of all energy produced globally—and for transportation, the second largest consumer of fossil fuels. Massive use of fossil fuels is considered unsustainable not only because it generates pollution but also because supplies are being depleted.

Nuclear power also cannot be considered a sustainable energy source because of the need to dispose of mountains of hazardous radioactive waste from nuclear reactors and the dangers from accidental emissions of toxic gases into the air.

Renewable energy sources—including hydroelectric, geothermal, solar, photovoltaic, wind, tidal and biogas—have not been widely used. They provide only 7 per cent of global energy, excluding traditional biomass (vegetation-based fuel, primarily wood-burning), which contributes 14 per cent. Almost all renewable energy currently used is from hydropower, which on a large scale has severe impacts on the environment, caused by the destruction of land flooded by dams, and on the people and animals who must be removed from that land.

Wood and other biomass fuels provide the only source of energy for more than 2 billion people in developing countries. Half of the forests cleared in those countries are cut to provide fuel for cooking and heating. Here too, environmentally sound alternatives must be found. Severe fuelwood shortages are expected early in the next century. People responsible for feeding families, usually women, already walk miles each day looking for wood that is increasingly scarce. This is not sustainable in its impact on either women's lives or the environment.

### Improving Energy Efficiency

Until renewable energy sources are developed, interim steps can be taken to burn fossil fuels more efficiently and as cleanly as possible. Improving energy efficiency to get the maximum amount of production from the least amount of fuel reduces not only fuel consumption but also the volume of pollution. Fuels can be burnt more cleanly, both at the point of energy conversion and when wastes are emitted, using techniques such as filters on smokestacks. (See Focus No. 3 on environmentally sound technology.)

Worldwide, energy savings of 40 per cent or more could be achieved by making existing technologies more energy-efficient. Studies in industrialized countries have concluded that emissions of $CO_2$ could be reduced by 15 to 30 per cent in 10 to 15 years if efficiency were strongly promoted. The potential for improvement is at least as great in developing countries, since many key sectors such as manufacturing and transportation use energy less efficiently in developing than in industrialized countries.

In many developing countries, the only option at present may be to build plants using fossil fuels. Improved operations and maintenance techniques can reduce environmental degradation, but the extra investment needed to reduce emissions is difficult for Governments to finance. In China, the United Nations is working to modernize a coal-fired power plant to reduce both the consumption of coal and the emission of pollutants. It is a pilot project for 112 similar plants. If more countries were given assistance, they could bypass the pollution-intensive phase that the industrial world has gone through, and instead move directly to more efficient technologies. In doing so, the full consequences of global warming might be avoided.

Many government policies and business practices can promote energy efficiency. Changes in manufacturing processes, such as the making of steel, can sharply reduce the amount of fuel required. Buildings can be better designed and managed. Cars can be designed for improved fuel economy (some Japanese and Swedish cars get over 80 miles to a gallon). Changes in products made can also lead to lower energy intensity (the amount of energy used per dollar of output). It is increasingly evident that public transportation systems in both industrialized and developing countries must be given priority if commuters are to be persuaded to leave private vehicles at home.

### Energy Policy Is Environmental Policy

A variety of powerful interests will have to be confronted before the availability and use of renewable sources of energy will be significantly increased. However, Governments can protect the environment by using market and pricing mechanisms—such as

taxes, tradable entitlements, incentives and disincentives—to encourage greater use of environmentally sound energy and the development of cleaner technologies. In 1983, Sweden raised the tax on oil to discourage its use. When oil prices were falling in 1986, Denmark raised fuel taxes and Portugal removed subsidies on some oil products to ensure long-term efficiency.

### Introducing Renewable Energy

Technologies for using solar, geothermal and tidal power have been developed but vary in sophistication and economic competitiveness. Renewable energy provides 5 per cent of the total energy requirements in Australia, Austria, Canada, Denmark, Sweden and Switzerland. Four solar energy plants are under construction in the United States to provide the residential power needs of 800,000 people.

In developing countries, the United Nations is helping to design solar systems for industry, agriculture and domestic power supply. The development of a highly efficient, affordable storage battery would be a key advance. Solar and wind energy could then be stored for use after dark and on calm days.

Research on alternative fuels for cars was given a boost in the United States by a law recently passed in California requiring that by 1997, 2 per cent of all cars must have zero emissions, and 10 per cent by 2003. Yet even existing battery-powered cars—which have a driving range of up to 40 miles before they must be recharged—could present a viable alternative for many people worldwide. Drivers in the United States average only 28 miles a day.

Wind projects operating in China and India with United Nations support are providing electrical energy for local needs. The UN is also testing an integrated energy system—using solar, photovoltaic and wind sources—in four Pakistani villages to evaluate the use of such systems in remote areas. It has also played a pioneering role in the development of geothermal energy. In Yemen, a UN biogas project is providing 70 to 80 per cent of household energy requirements in small villages.

Although there is a clear need for more research in renewable energy technologies, spending in that field by the countries that are members of the International Energy Agency fell from $1.5 billion in 1981 to about $500 million in 1989. Some renewable technologies are already competitive; more research will lead to lower costs and greater reliability, especially in photovoltaic and biomass energy. It is estimated that using a mix of energy sources could cut emissions of carbon dioxide by as much as 68 per cent.

Today, the world depends on fossil fuels for 85 per cent of its energy needs. The risks of continuing business as usual are the pervasive health problems and deteriorating quality of life caused by air pollution, as well as the catastrophic flooding and loss of secure food and water supplies projected to arise from global climate change.

Leaders attending the Earth Summit will attempt to devise a blueprint for a brighter future. In the area of energy policy, this will involve rethinking daily practices for both individuals and institutions, and will require changes in national and global policies and spending priorities.

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